



# CSIR NEWS

A FORTNIGHTLY HOUSE BULLETIN OF CSIR

VOL. 27

30 OCTOBER 1977

NO. 20

## Semi-Automatic Electrochemical Marking Machine

A new semi-automatic electrochemical marking machine has been developed by the Central Mechanical Engineering Research Institute (CMERI), Durgapur, under a project sponsored



Semi-automatic electrochemical marking machine : CMERI, Durgapur

by Vanaj Engineers Ltd, Poona. Simple in construction and economic in working, the machine is used for marking brand names and monograms on a wide range of metallic products, viz. H.S.S. tool bits, saw blades, cutleries, razor blades, stainless steel products, carbide inserts, brass and aluminium products, and chromium and nickel plated materials. The marking may be brown, grey, black or colourless depending upon the products to be marked and source of current used. The die consists of stencil paper, with contents marked on it. The electrolyte flows between the cathode (containing stencil) and the anode (containing work-piece) and the process takes 5 to 10 sec. The machine works on 6/12/18/24 V tapping of ac/dc, has a foolproof electrical circuit, and is protected from short circuiting. Further, the machine has the following advantages: (i) the flow of electrolyte is by gravity and through spraying distributor; (ii) the work-holding device is adjustable; (iii) the machine is operated by foot pedal; (iv) the machine is provided with built-in arrangement for washing; (v) loading and unloading are quick acting; (vi) the rate of production is 6-12 pieces per min; and (vii) even an unskilled labourer can run the machine.

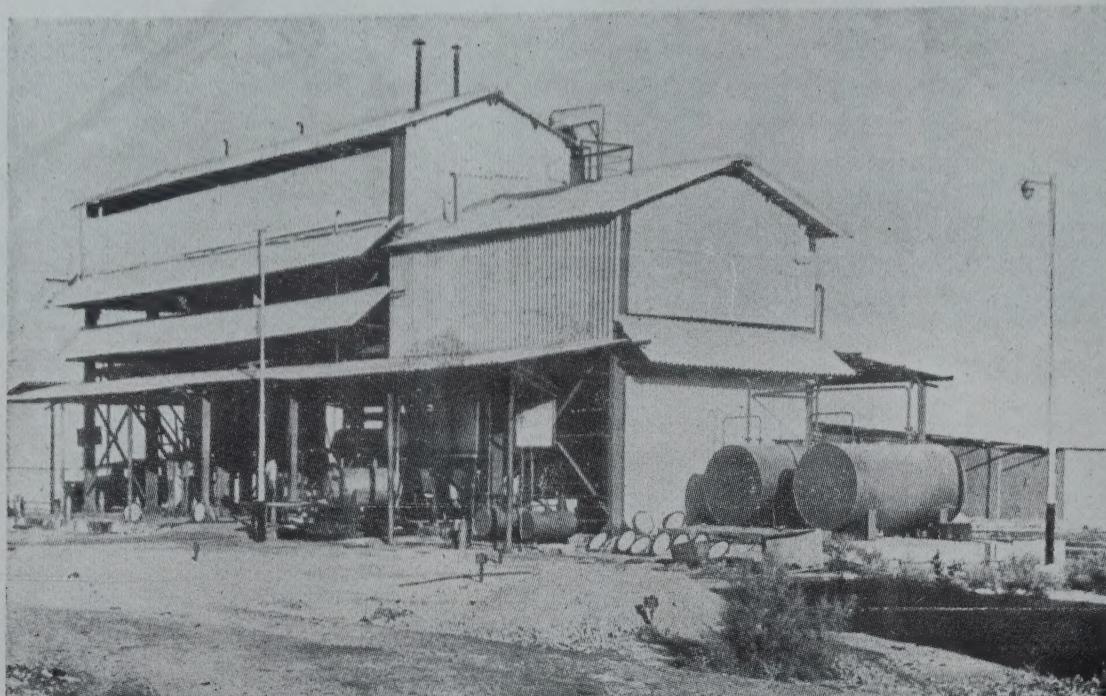
The machine can also be provided with timer and solenoid-operated switch to meet the specific needs of the customer. Each stencil impression lasts for at least 100 markings. The production cost of the machine without timer is less than Rs 1000.

## Export of Microcrystalline Waxes Based on IIP Know-How

For the first time in the country, microcrystalline waxes produced using the know-how developed at the Indian Institute of Petroleum (IIP), Dehra Dun, are being exported by the Oil & Natural Gas Commission (ONGC) to various developed countries. ONGC has recently exported the first consignment of 20 tonnes of microwax to a firm in Los Angeles through the State Chemicals and Pharmaceuticals Corporation, and earned foreign exchange to the tune of Rs one lakh. Orders for export of microwax to other developed countries such as UK, Germany and Japan have also been secured. ONGC has set up at Ankleshwar a plant costing about Rs 20 lakh and with a production capacity of 20 tonnes per month. Efforts are under way to step up its capacity in view of the increased demand abroad. The microwax is being produced from tank bottom sediments of the Ankleshwar crude oil, which had so far been considered as a waste. These waxes (mp 90-93°C) find use in the manufacture of polishes, rust preventives, electrical insulation, paper coating and in leather treatment. Two IIP scientists, Shri K.M. Agarwal and Shri Y. Kumar, recently visited the Ankleshwar plant at the request of ONGC to help improve the quality of the product.

The process developed at IIP consists in recovering and purifying microcrystalline wax from the bottom sediment accumulated in the crude oil





Microcrystalline wax plant based on IIP know-how : Ankleshwar

storage tanks. This is a waste product obtained during the process of producing and pumping out crude oil.

The accumulated tank bottoms are melted, thereby removing water and sediment by setting. The lighter fractions like naphtha, kerosene and gas oil are removed by distillation under vacuum, and then the residue is treated with sulphuric acid to remove asphaltic matter. After removing the acid sludge, the acidified wax is treated with sodium carbonate and activated charcoal for neutralization and decolorization and finally filtered through a pressure filter. The molten wax is then passed through a flaking machine and microcrystalline wax is obtained in the form of flakes.

### Continuous Forming of Etched Aluminium Foil

The Central Electrochemical Research Institute, Karaikudi, has developed a high-speed continuous process for forming high-gain etched aluminium foil. These formed aluminium foils are incorporated in low-voltage aluminium electrolytic capacitors used in transistors. The demand for formed aluminium foil, which is being met mostly by imports, is likely to increase in

view of the high tempo of activity in the electronics industry.

The process is basically an anodizing one. Excepting the super-pure aluminium foil, all the raw materials required for the process are available indigenously. The capital investment for a plant of 54 m<sup>2</sup> (approx.) of formed super-purity aluminium foil per annum capacity is estimated at Rs 14.5 lakh, the cost of production at around Rs 75/m<sup>2</sup> and the selling price per unit at Rs 81/m<sup>2</sup>. The return on investment is expected to be 24%.

### Electronic Sedimentation Balance : NIO

The National Institute of Oceanography (NIO), Goa, has developed an electronic device for automatic recording of the rate of settlement of sea bed sediments. The instrument senses the

weight of the material settled on a pan kept at the bottom of the settling tube and records it in a continuous potentiometric recorder against time, thereby giving the settling rate very precisely. The electronic unit converts the signals from the balance into dc voltage for feeding the indicating meter and the recorder.

The following are the features of the instrument :

Settling

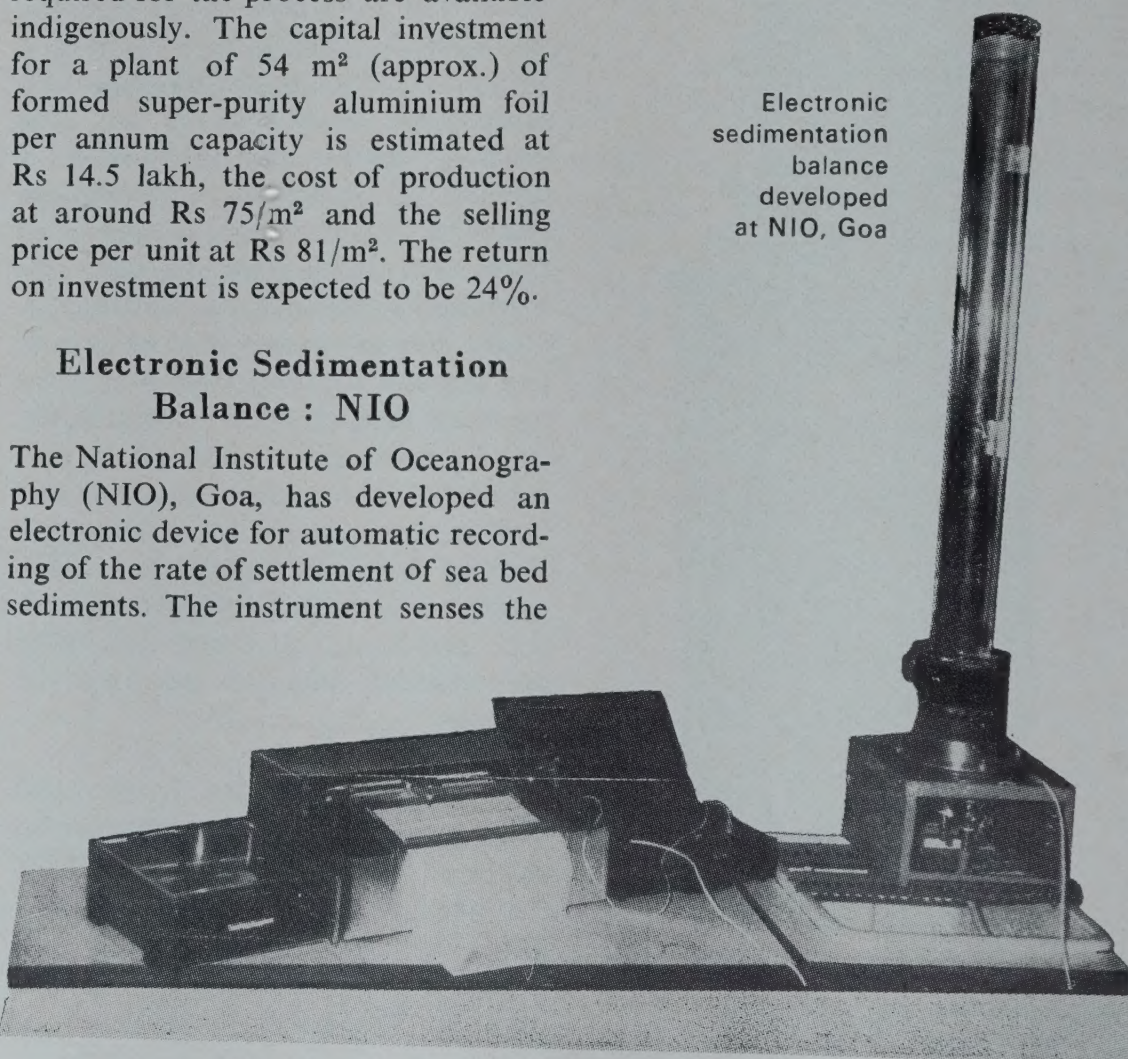
tube : 1 m long, 8.5 cm diam.

Range of measurement : samples of different quantities can be used in the ranges 1, 3, 5, 10 and 20 g for giving full-scale deflections.

Accuracy of : + 0.5% of the range measurement

The instrument is capable of measuring settling rates ranging from 10 sec. to a few hours or days. For longer settling rates, the recorder can

Electronic sedimentation balance developed at NIO, Goa





be operated at different paper speeds to save paper consumption, or the observation can be made at required intervals from the recorder or meter either manually or with the help of a programmed electronic timer. More than 100 samples can be tested at a stretch before the tube is drained and the instrument can be made ready for the next series within about 10 min.

The instrument is operated at 9 V from self-contained dry cells and the recorder is operated from ac mains or batteries as the case may be. All the components of the instrument are indigenous. The estimated cost of the instrument is about Rs 6500. The device is useful to organizations concerned with survey and civil constructions in the sea such as ports and harbours, geological surveys, research laboratories, etc.

### Synthetic Iron Oxide Red and Black

Iron oxide pigments are the most important inorganic pigments used in paint industry and as colouring agents in ceramics, plastics, rubber, etc. Superior quality synthetic iron oxide pigments are mostly imported and the country's demand far exceeds the indigenous production. The Regional Research Laboratory (RRL), Bhubaneswar, has developed a process for converting waste iron chloride liquors into iron oxide red and black, using readily available raw materials.

Iron oxide red finds application in paint, rubber, tile, linoleum, ink and other industries. Iron oxide black is however used to a limited extent.

Synthetic iron oxide red is being produced in the country by two firms. However, their production is inadequate to meet the country's requirement and a large quantity of the material is still being imported.

The RRL process consists in the addition of milk of lime to a solution of ferrous chloride, resulting in the precipitation of ferrous hydroxide. The catalyst is then added in required quantity and air is bubbled in to oxidize the ferrous hydroxide suspen-

sion to the magnetic oxide (black oxide) stage. The suspension is filtered. The black iron oxide residue is washed with water and dried first at room temperature and later at a higher temperature in an air oven. The process may either be terminated at this stage or the black oxide is suitably roasted in the presence of air to get the red oxide of iron.

The process has been studied on a bench scale of 250 g per batch.

Hydrochloric acid and lime or ferrous chloride liquor and lime, and iron scrap are the main raw materials required in the process. All these are available indigenously.

The essential items of plant and machinery required are: dissolution tank, storage tank, stirring tank (MS), reaction vessels, centrifuge, tray drier, hammer mill, rotary kiln, water heater, pump, compressor, and testing equipment.

The suggested capacity of an economically viable unit is 60 tonnes of synthetic iron oxide black and red per annum. The capital outlay required to put up such a unit is estimated at Rs 2.35 lakh. The cost of production has been worked out at Rs 4.50/kg.

### Ultrasonic Therapy Unit

NRDC Award-winning Invention

An ultrasonic therapy unit has been developed by Shri K. M. Swamy and Shri R. S. Rohella of the Regional Research Laboratory (RRL), Bhubaneswar. The unit has versatile utility in the field of physical medicine and therapy.

An ultrasonic therapy unit mainly consists of a generator of radio frequency electrical waves and an ultrasonic probe. The generator produces an electrical power output of 15 W at a frequency of 720 kHz within  $\pm 1\%$  stability. The control provided with the equipment can continuously vary the

Shri K. M. Swamy and Shri R. S. Rohella have been awarded the Independence Day (1977) award of the National Research Development Corporation of India [*CSIR News*, 27 (1977), 130].

power output from zero to maximum and thus any intensity from 0 to 3 W/cm<sup>2</sup> required for the treatment can be selected.

An electronic timer incorporated in the unit provides automatic control of the time of treatment of diseases from 0 to 15 min. and switches off the generator output after the preset time. The versatility of the unit for the treatment of many more diseases is further increased by provision of two types of waves, viz. continuous and pulsed (1:1), in the same unit.

The electrical power produced by the generator is applied to the ultrasonic probe which converts electrical waves to ultrasonic waves at the same frequency. The probe consists of a transducer (piezoelectric element) PZT 4 housed in an aluminium metal housing mounted with half-wave mode. The conversion efficiency of the probe is very high and the transducer has high tolerance in the fundamental frequency and can work in the frequency range of  $720 \pm 40$  kHz.

A multiplicity of diseases can be treated with the ultrasonic therapy unit, and the most prominent diseases that could be cured are: diseases of the peripheral nervous system (neuritis and neuralgias), diseases of the skeletal muscle system (spondylitis, arthritis and myalgias) and diseases of the skin (various ulcers and scleroderma).

The prototypes of the above unit were fabricated in the laboratory and were tested on patients at S.C.B. Medical College and Hospital, Cuttack. Modifications in accordance with the suggestions were provided in the unit to suit the medical practitioners. Two units were also displayed at the international trade fairs in Bulgaria and Brazil.

The raw materials for the fabrication of the equipment are readily available in the country and fabrication can be carried out by semi-skilled technicians. The unit costs Rs 4000 as compared to about Rs 7500 for an imported unit of similar specifications.



The know-how has already been transferred to two parties for commercial exploitation.

### **Collaborative Agreement between NCL and HOC**

A collaborative agreement has been signed between the National Chemical Laboratory (NCL), Poona, and Hindustan Organic Chemicals (HOC) Ltd, Rasayani, for the setting up of a semi-commercial unit for the manufacture of butenediol at HOC and development work at NCL. Under the agreement, a semi-commercial plant (capacity, 0.5 tonnes/day) will be erected at HOC for collecting data for the design of a commercial plant to be set up by HOC after the successful operation of the pilot plant.

Butenediol finds use as an intermediate in the production of the insecticide endosulfan, butadiene diepoxide and polyurethane structural laminates with high flexural strength and modulus. At present, butenediol is not manufactured in the country and its estimated annual demand is around 2000 tonnes, valued at about Rs 60 million.

### **Viscose Staple Fibre Blending : Seminar at ATIRA**

In the context of shortage of cotton production and the consequent need to blend man-made cellulosic fabrics with cotton, the Ahmedabad Textile Industry's Research Association (ATIRA), Ahmedabad, organized, in collaboration with Unicef Ltd, Zurich, a seminar on Viscose Staple Fibre Blending on 10 September 1977.

Four papers dealing with general characteristics of viscose rayon staple; blending of viscose with cotton and its spinning; weaving, knitting and finishing; and future prospects for viscose rayon staple in new technologies such as open-end spinning and non-woven fabrics were presented.

Dr C. Rossi, Executive Vice President of Italviscosa Eastern Trading S.p.A., Milano, who attended the seminar, said that this seminar should

be considered as a beginning of a dialogue between producers and users of viscose staple. The seminar, attended by about 375 technical personnel from local as well as outstation member mills of ATIRA, was presided over by the chairman of Council of Administration of ATIRA, Shri Navnitlal Shodhan.

### **BITM Celebrates Fifty Years of Radio Broadcasting in India**

The Birla Industrial & Technological Museum, Calcutta, in collaboration with the All India Radio and the Institute of Radio Physics and Electronics, Calcutta University, Calcutta, celebrated the golden jubilee of radio broadcasting in the country. The programme at the museum included, among other items, exhibition on 50 years of radio broadcasting in India; lectures and seminars relating to radio broadcasting; and a training camp in amateur radio telegraphy. An amateur radio station was installed from where one could talk to radio operators in India and abroad.

The exhibition was inaugurated by Shri L.K. Advani, Union Minister for Information and Broadcasting, on 26 August 1977, the day when the Calcutta radio station started operating 50 years ago. The celebrations continued up to 11 September 1977. The programme drew more than 20,000 visitors, including about 10,000 students from about 250 schools.

### **Deputation Briefs**

Dr K.S. Narasimhan of the Regional Research Laboratory, Bhubaneswar, visited USA from 2 April to 11 May 1977 under the India-US Scientists Exchange Programme and acquainted himself with the latest technological trends in minerals utilization—both ferrous and nonferrous. Dr Narasimhan visited 27 organizations, which included government and private research laboratories, academic institutions and production units concerned with mineral utilization and energy.

An important observation made by the visiting scientist is that USA has developed technologies for utilization of as low-grade ores as of iron ores containing 36% iron and of copper ores containing around 1% copper. In the wake of the current energy crisis and the need for ecological preservation, efforts are being made to redesign processes so as to make them either less energy-intensive or to depend on more abundantly available coal resources. Most of the American coals being high-sulphur ones (in contrast to low-sulphur Indian coals) the problem in effect becomes one of abating pollution and therefore the pyrometallurgical process far outweighs the economics. The developments are therefore centred round either on improving the energy efficiency of pyrometallurgical processes or on innovating better hydrometallurgical processes. Basic researches relating to mineral processing of long-range importance include efforts to widen the range of applicability of different operations employed in mineral processing, handling of very fine particles, understanding of individual operations like comminution flotation, ready availability of versatile equipment for materials handling, specific and specialized instruments and control equipment, and analytical tools which are speedy and accurate.

### **Progress in Geophysics**

Brought out by the Geophysics Research Board (GRB) of CSIR and the National Geophysical Research Institute (NGRI), Hyderabad, Progress in Geophysics, a serial publication, reviews the progress of geophysical activities in India every year. This volume is the eleventh in the series and covers the period January to December 1975. The publication contains specialist-compiled reviews of the work in the following ten areas of geophysics: Gravity and geodesy (R.S. Chugh); Geomagnetism and geoelectricity (B.N. Bhargava); Aeronomy and space science (R.G. Rastogi



& Girija Rajaram); Seismology and physics of the earth's interior (H.M. Chaudhury); Geophysical exploration for minerals and groundwater, engineering geology and crustal studies in India (L.N. Kailasam); Hydrology (B.K. Baweja); Volcanology, geochemistry, geochronology and tectonophysics (reports for 1974 & 1975) (V.K.S. Varadan); Meteorology and atmospheric physics (Y.P. Rao); Physical oceanography and marine geophysics (S.Z. Qasim & V.V.R. Varadachari); and Geophysical exploration for oil (S.N. Sengupta).

A bibliography is provided under each review. The publication also contains a list of important Indian journals in earth sciences, a list of Indian national committees and research committees in the field of earth and planetary sciences, and an index of institutions.

The 216-page (royal 8vo) publication is priced Rs 20.00 (\$ 3), and is available with the National Geophysical Research Institute, Hyderabad 500007.

## PROGRESS REPORTS

### CDRI Annual Report: 1975

The Central Drug Research Institute (CDRI), Lucknow, has brought out its annual report for 1975. The report records the institute's R&D activities in the eleven major areas : antifertility agents, parasitic infections, amoebiasis, cholera immunology, viral infections, natural products, cardiovascular and nervous system disorders, disorders of carbohydrate and lipid metabolism, cancer, fermentation technology, and process development of drugs and pharmaceuticals.

An economic process for isolation of the anti-Parkinsonism drug L-Dopa from the beans of *Mucuna prurita* was standardized and demonstrated to the sponsoring firm. Dimethylbenzimidazole, an intermediate required for vitamin B<sub>12</sub> manufacture, was under production by a small scale unit based on the CDRI process. This intermediate is an import substitution.

Processes for paracetamol and lidocaine were released for commercialization.

A mutant strain of *Bacillus polymyxa* which is capable of giving a commercially viable yield of polymyxin B, an important antibiotic, has been developed.

A contraceptive cream containing total saponins of *Sapindus mukorossi* has been found to be effective for intravaginal use. It was found to be safe in toxicity studies carried out on rabbits. Centperazine, a new antifilarial compound under development, has been found to be without side-effects in single-dose phase I clinical trial and well tolerated up to 600 mg dose. A newly synthesized analogue of diethylcarbamazine showed promising antifilarial activity in animal tests. Limited field trials with Centchroman, the new oral contraceptive, were continued by the Union Ministry of Health and Family Planning in once-a-week dose as a possible prophylactic and single dose *post-coitum*. The latter schedule showed encouraging results and the trials were being continued.

A potent  $\beta$ -adrenergic blocking compound has been synthesized which is marginally more cardio-selective

than propranolol with considerably less cardiac depressant activity. It also has anti-arrhythmic activity. Clinical trial (phase I) of a new hypo-glycemic, centpiperalone and phase II trial of the anti-inflammatory agent curcumin from *Curcuma longa* (*haldi*) were continuing satisfactorily. In teratogenic studies, these compounds did not show abnormalities in mice and rabbits.

A heterocyclic quinone has shown activity against *Candida albicans* infection in mice at 0.625 mg/kg in oral administration.

A new animal model of filarial infection has been standardized by infecting the multimammate rat, *Mastomys natalensis*, with *Litomosoides carinii*, the cotton rat filarial parasite. This model will be useful for immunological and chemotherapeutic studies of filariasis.

Using various excystment agents in the presence of metabolic inhibitors, it has been observed that excystment of cysts of soil amoebae does not involve synthesis or transcript of DNA; *de novo* protein synthesis, presumably coded by pre-existing stable messenger RNA, appeared to be essential.

One hundred and three papers were published and twelve patents filed.

## CSIR SUPPORT TO RESEARCH

### New Schemes

#### Growth Perfection and Analysis of Calcite

Investigations undertaken by Dr G. S. Laddha, Director, Alagappa Chettiar College of Technology, Guindy, Madras, under a new CSIR scheme granted to him, aim at growing optically clear calcite crystals of large size by the moving zone technique and at studying the thermal, electrical, optical and surface properties of pure and doped calcite crystals.

Calcite is birefringent. Its strong double refraction is utilized to obtain polarized light by means of the nicol and glass brooke prisms for use in

petrological microscopes, colorimeters, photometers and saccharimeters. Calcite is used in the double-image prisms like Wollaston's prism, Rochon's prism and Senar Mount's prism, all of which are used to produce two widely separated polarized beams of light.

Natural calcites are collected from various mines. But the material is not always pure and transparent. Isolated pockets of transparent calcite are available from some mines. After careful clearing, a few transparent pieces of good quality may be obtained. Owing to shortage of calcite, efforts were made to replace calcite by sodium nitrate, the only other material which has properties similar to those of calcite. Since sodium nitrate is hygro-



scopic, these attempts have not been successful.

It is now certain that calcite cannot be replaced by any other birefringent material. Recent improvements in the optical transmission of glass fibres hold promise for optical communication in which calcite will have an important role to play. Since it is becoming increasingly difficult to get natural calcite of required quality, efforts should be made to produce synthetic calcite. Calcite can be grown in silicic acid gel. The crystals harvested are of small size. The growth rate is very low and it takes three to four months for growing these small crystals. Since calcite dissociates before melting, it cannot be grown from the melt. It is, therefore, planned to develop chemical dissolution moving zone technique for growing calcite and this technique can yield very large crystals within a few days. The calcite crystals will be doped with various impurities, and the various physical properties of these doped crystals will be investigated.

### **Tumour Formation in Mice due to Prenatal Irradiation**

Ionizing radiation is known to be effective in producing a wide variety of developmental defects in the mammalian embryo and fetus, including the human ones, although the available evidence is not universally accepted, especially for effects reported to occur in animals and humans from doses below about 25 rads.

Experimental studies with animals, and some limited human epidemiological studies and case reports have indicated that X-ray exposure represents a hazard to the unborn child. The magnitude and kinds of possible effects depend upon the amount and type of ionizing radiation received and the stage of fetal development at the time of exposure.

The possible teratogenic effects may be gross morphological changes, severe mental retardation and functional

changes in the central nervous system, including alterations in neurological functions or behaviour. Radiation exposure of the fetus during all stages of pregnancy has been associated with an increased incidence of leukaemia and other childhood cancers.

In a survey carried out at Oxford, abdominal X-ray examinations during pregnancy were estimated to increase cancer in the child's life. Several authors of the epidemiological studies have reported that offsprings born to mothers who had received a small amount of X-radiation during their pregnancy had a higher incidence of leukaemia and other cancers. But several other workers have reported contradictory observations. Thus, the carcinogenic effect of a small dose of radiation during intrauterine life is controversial.

The risk of childhood cancer following a dose of 1 rad from obstetric radiography is 1:7. In a new CSIR research scheme granted to Dr Y. C. Agarwal of the J. K. Cancer Institute, Kanpur, it is proposed to study the effect of radiation at low doses similar to that encountered in obstetric diagnostic radiology. In experiments carried out at that institute with Swiss mice, it was observed that even a dose of 10 rads had carcinogenic potentiality.

Swiss strain of mice with low tumour incidence will be chosen for the proposed study. Mouse has a gestation period of about 20 days and the period of organogenesis is between  $8\frac{1}{2}$  and 16 days. Four adult females along with an adult male will be confined in a cage for mating. The male will be separated and the females will be checked for the vaginal plug after about 2 hr. The females with vaginal plug will be separated and labelled as zero day of gestation. These mice will be irradiated on 11th day of gestation. The pregnant females will be fixed to a board and will be given a single X-radiation exposure. About 25 pregnant mice will be irradiated to a dose of 5 rads. Similarly, the animals will be irradiated to a dose down to 0.1 rad.

The irradiated females will be allowed to litter and will be sexed and housed separately on the 30th day. These offsprings which receive prenatal exposure will be observed. Blood will be examined at frequent intervals and animals will be tested for any tumour. These animals will be sacrificed, or autopsy will be done as the case may be. Histological examinations will be done of all the tissues. Routine and special staining will be done and impression smears will be taken as and when needed.

### **Radiation-Induced Changes in the Structure and Function of Thyroid of Mammals**

The importance of thyroid in the mammalian body, owing to its role in the respiratory control and regulation of metabolism, is beyond dispute. The hormone thyroxine is known to be involved in a highly diverse series of biological reactions: growth and development, metabolic rate, heart rate, neuromuscular activity, reproduction, cerebral activity, fluid and electrolyte balance, etc.

Ionizing radiations can cause irreversible damage in biological macromolecules and render them inactive. Damage to the thyroid follicles inhibits thyroxine synthesis and release. This inhibition may be at the initial level of iodine uptake or at later stages when the inorganic iodine is incorporated into tyrosine and the hormone synthesized. Impairment of thyroid function can impair the body function, often leading to death.

Several SH-compounds have been in use as radio-protectors of mammals against radiation-induced death. But till recently, all the drugs used were toxic to the tissues at doses at which they give maximum protection; hence their application in clinical field has been limited. More recently, a new synthetic SH-compound, 2-mercaptopropionylglycine (MPG) has been found to give considerable protection



at very low doses (1/100 of the toxic dose) when administered intraperitoneally before exposure. This chemical has been in use since long as a detoxicating agent and no side effects have been noticed at the dose levels used for protection. This new discovery that this drug can be administered safely to man has inspired further work in the field of chemical protection.

Under a new CSIR scheme sanctioned to Dr (Mrs) P. Uma Devi of the Department of Zoology, University of Rajasthan, Jaipur, it is proposed to study the effect of MPG on the thyroid structure and hormone synthesis in mice irradiated with high doses of gamma radiation. Both histopathological and biochemical changes will be studied to understand the mechanism of action of this drug. An understanding of its action at the biochemical level is likely to reveal the mode of action of ionizing radiations in rendering the biological molecules inactive. The results of such a study may prove to be of great value in the field of medicine, where high doses of ionizing radiations are used, especially in the treatment of cancer.

### Fluid Energy Milling

Production of fine particles of the order of a few microns involves high energy consumption when conventional methods like ball milling are used. But, fluid energy milling can be used economically for this purpose. It also yields a product of narrow size distribution. So far, the effects of different operating variables on the performance of jet mills have not been comprehensively studied.

In a new CSIR research scheme granted to Dr M. Ramanujam of the Indian Institute of Technology, Madras, it is proposed to study the micronizer type jet mill by direct visualization of the grinding zone and to develop a suitable technique by connecting the operating variables for scaling up the mill. The mill will be constructed with a transparent lid over the grinding

zone. A triboluminescent material, which will emit light during grinding, will be used as the test material. The light emitted during grinding can be visually seen through the transparent lid and photographic techniques will be used to find out qualitatively the changes in the pattern of grinding with the changes in various parameters. Also, using a photomultiplier arrangement, the intensity of light emitted during grinding, which is a function of newly produced surface area, can be measured. This will help measure the overall grinding. It is proposed to develop a model for the fluid energy milling for predicting the product size distributions for given parameters characterizing the feed material, and the geometry and the operating conditions of the mill.

### Rational Design of Bullock Cart on Systems Approach

There has been an increasing interest in recent years in the improvement of the bullock cart and its attendant problems. Developmental work in this field has been undertaken in a new CSIR scheme granted to Prof. K. Nagi Reddy of the Regional Engineering College, Warangal. The basic approach to the problem at this centre consists of (i) measurement and evaluation techniques, (ii) development of subsystems, and (iii) integration of subsystems into suitable designs to provide optimum solutions under various conditions of use.

A few assumptions are made in the study, and on the basis of these assumptions, it is proposed to evolve methods of measuring and recording the tractive effort of the bullocks under various conditions. The bullock cart is considered to consist of the following systems: wheels, axles and suspension, chassis and body, yoke, drawbar, and driver-operated brakes.

A few alternative designs of the above systems will be studied and a design basis for each will be drawn up. Also, carts of suitable designs will be

fabricated and tested. Ergodynamic studies on bullocks, and load volume and load endurance studies will be taken up in the second stage.

A manual read-out device for measuring tractive effort has been designed and is undergoing field evaluation.

## PERSONNEL NEWS

### Appointments/Promotions

#### Dr B. R. Sant

Dr B.R. Sant of the Regional Research Laboratory (RRL), Bhubaneswar, has been promoted to Scientist E II from Scientist EI with effect from 17 December 1975.

Dr Sant (born 26 July 1932) has had a brilliant academic career at the Banaras Hindu University (BHU) from where he obtained his M. Sc. (1951) in chemistry and Ph.D. (1954). He was awarded Chancellor's gold medal for securing the highest percentage of marks at the master's level.

Dr Sant joined RRL as a Scientist in 1965. Before joining RRL, Dr Sant was in ICI (India), Calcutta, as a Management Executive and in BHU as a faculty member. He was in USA and Canada for about three years. At RRL he has planned R&D work in the areas of mineral beneficiation, extractive metallurgy with particular reference to hydrometallurgical/chemical leaching methods, treatment of ores and minerals for the preparation of inorganic chemicals, and utilization of industrial wastes and byproducts for the recovery of valuable constituents.

Dr Sant has undertaken a number of projects in the fields of utilization and processing of minerals such as nickel and cobalt bearing laterites, blue dust, low-grade iron and manganese ores, chromites, low-grade copper ores and china clays. By 1972 many of these projects had been successfully completed. Dr Sant organized a new discipline of inorganic chemicals in the fields of bacterial leaching of low-grade ores and concentrates and chemical beneficiation of high-phosphorus manganese ores. Dr Sant has



established an R&D school in the fields of synthetic inorganic pigments, catalysts, high-purity and special-grade inorganic oxides and other chemicals. With emphasis on the utilization of industrial byproducts and waste products, he has developed new and improved methods for inorganic pigments, chromium oxides, vanadium pentoxide, metal sulphates, etc.

Dr Sant is a Fellow of the Royal Institute of Chemistry, London, and a founder-member of the Indian Institute of Mineral Engineers. He was member of the first NCST panel on mining, steel and metallurgical industries and the chairman of the sub-panel on non-ferrous metals. He is the project coordinator for the inter-laboratory project on recovery of metallic values by bacterial leaching and is heading the project teams for chemical beneficiation of manganese ores and development of catalysts.

Dr Sant has contributed reviews on pelletization, microbiological leaching, bauxite residue (red mud), gallium, manganese oxides, ferrous sulphate, shift conversion catalyst, iron oxide pigments, etc. He has to his credit more than 90 research papers and about 20 patents.

### Dr P. K. Dutta

Dr P. K. Dutta of the Regional Research Laboratory (RRL), Bhubaneswar, has been promoted to Scientist EI with effect from 15 March 1977.

Dr Dutta (born July 1929) obtained his B.Sc. (Hons) (1952) in agriculture from the Delhi University, M. Sc. (1954) in plant physiology from the Banaras Hindu University, and Ph. D. (1958) in agricultural botany from the University of Minnesota.

Dr Dutta joined the Regional Research Laboratory, Jammu, as a Scientist in July 1959. He planned and organized research and development work on the cultivation of aromatic and medicinal plants, particularly *Mentha arvensis*. Dr Dutta has been responsible for establishing a field station of the

Laboratory at Jammu for conducting research on the cultivation of medicinal and aromatic plants. He was promoted to Scientist C in 1966 and in 1968 he was transferred to RRL, Bhubaneswar, to initiate cultivation of plants of aromatic, medicinal and other economic importance in Orissa region. Since then Dr Dutta has been heading the Aromatic and Medicinal Plants Division and his main emphasis has been on the introduction, cultivation and survey of such plants. He has established an experimental farm at the laboratory where experiments are being conducted to find out the plants of aromatic and medicinal value that could be cultivated profitably in this region. He is intimately associated with the introduction and cultivation of such crops as palmarosa, cinnamon, *Eucalyptus citriodora* and *Solanum*

## COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

### Advertisement No. 19/77

It is proposed to appoint a Scientist F in the Regional Research Laboratory, Jorhat (Assam).

One of the major objectives of RRL, Jorhat, is to help the development of north-east India, which includes Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura states. This region is rich in renewable resources, especially abundant forest wealth, and affords great scope for economic and industrial development based on these resources aimed at betterment of the quality of life of the people, over 80% of whom live in the rural hilly areas. Paper boards and cellulose pulp based on renewable resources and agricultural wastes thus constitute a major functional area in the laboratory. It is now proposed to make a senior appointment in the rank of Scientist F (Deputy Director) to head this functional area.

**Job Requirements:** The selected scientist is expected to provide high-level leadership to formulate, organize, direct and conduct research and development programmes relating to utilization of cellulosic materials for different types of speciality papers and other products and new products and technologies based on forest products and agricultural wastes. Responsibilities would include transfer of research results from laboratory through appropriate upscaling stages to the industry and the field. This is a senior management position and the successful candidate would

*khasianum* which could be grown successfully in the region. It is due to his effort that the cultivation of aromatic and medicinal plants is being taken up for the first time by government departments and private entrepreneurs.

Dr Dutta has 30 research papers and a number of technical reports to his credit.

### Retirements

Shri A. Ganesan and Shri S.K. Maira (both Scientists B) of the National Environmental Engineering Research Institute, Nagpur, have resigned (24 Aug. and 2 Sep. 1977 respectively).

### Transfers

Shri V.G. Dahale has joined, on transfer from CSIR Secretariat, the National Environmental Engineering Research Institute, Nagpur, as Section Officer on 29 August 1977.

assist the Director in some spheres of internal management of the laboratory.

**Qualifications and Experience:** High academic qualifications in science or technology in the area of polymers, cellulosic materials, forest products or allied fields. At least 10 years' R&D experience with proven capability as an independent investigator and leader. Experience or inclination towards research programmes and technologies for rural industries. Management abilities consistent with the job requirements indicated above.

**Salary/Conditions of Service:** The salary scale attached to the post is Rs 2000-125/2-2500. Initial pay will be fixed according to merit. The person selected will be appointed on contract for a period of six years, which would be confirmed after an initial period of two years of satisfactory service. Other conditions of contract will be supplied on request.

**Age limit:** Below 50 years, relaxable in special cases.

Scientists/technologists interested may obtain a standard proforma for sending their *curriculum vitae* from the Chief (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001. They can also obtain a brochure on the aims and objects and the latest annual report of the laboratory. Completed *curriculum vitae* proforma must be received in this office on or before 17 November 1977.

Canvassing in any form and/or bringing in any influence, political or otherwise, will be treated as a disqualification for the post.